REMARKS

Claims **1-7, 9-15, 17-22, 24-30, 32-38, 40-46, 48-54** and **56-58** are pending in the application.

Claims **1-7, 9-15, 17-22, 24-30, 32-38, 40-46, 48-54** and **56-58** stand rejected.

Claims **1, 6-7, 9, 17, 24, 29-30, 32, 40, 45-46, 48** and **58** have been amended. Support for these amendments can be found at least in the instant Specification at p.4, line 1, through p. 5, line 25.

Rejection of Claims Under 35 U.S.C. § 103

Claims 1-7, 9-15, 17-22, 24-30, 32-38, 40-46, 48-54, 56-58 and rejected under 35 U.S.C. § 103(a) as being unpatentable over Uga et al., U.S. Patent No. 6718326 (Uga) and in view of Venkatachary et al., U.S. Application Publication No. 2002/0089937 (Venkatachary).

While not conceding that the cited references qualify as prior art, but instead to expedite prosecution, Applicant has chosen to respectfully disagree and traverse the rejection as follows. Applicant reserves the right, for example, in a continuing application, to establish that the cited references, or other references cited now or hereafter, do not qualify as prior art as to an invention embodiment previously, currently, or subsequently claimed.

In order for a claim to be rendered invalid under 35 U.S.C. § 103, the subject matter of the claim as a whole would have to be obvious to a person of ordinary skill in the art at the time the invention was made. *See* 35 U.S.C. § 103(a). This requires: (1) the reference(s) must teach or suggest all of the claim limitations; (2) there must be some

teaching, suggestion or motivation to combine references either in the references themselves or in the knowledge of the art; and (3) there must be a reasonable expectation of success. *See* MPEP 2143; MPEP 2143.03; *In re Rouffet*, 149 F.3d 1350, 1355-56 (Fed. Cir. 1998).

At the outset, while maintaining points made in earlier Office Action responses, Applicant respectfully notes the fundamental structure of the invention, as claimed in independent claims 1, 9, 17, 24, 32, 40 and 48, is generally directed to methods, systems network elements and so on, that employ a content-addressable memory that, when presented with information from a packet, in turn presents an index to a <u>multi-feature</u> classification memory, in which each of the multi-feature packet processing rules is formed by merging a plurality of features according to a feature hierarchy. Thus, each rule actually represents a number of rules that have been merged into the one rule, and such merging is performed according to the feature hierarchy.

Each of these memories stores respective information regarding the processing of a packet (an index into the multi-feature classification memory, in the case of the content-addressable memory, and <u>one or more *multi-feature* packet processing rules</u> stored in the multi-feature classification memory). The use of multi-feature packet processing rules, in particular, ones that are merged *<u>according to</u>* <u>the feature hierarchy</u>, differs markedly from anything taught in Uga or Venkatachary, or otherwise known in the art at the time of invention.

Thus, according to the claimed invention (as claimed in independent claims 1, 9, 17, 24, 32, 40 and 48), providing the first memory (e.g., the content-addressable memory) with information from a packet allows the first memory (e.g., the content-addressable

memory) to provide an index that is then used to access one or more corresponding <u>multi-feature</u> packet processing rules stored in the second memory (e.g., the multi-feature classification memory). In so doing, the network device employing the claimed invention can then use appropriate ones of its features to perform appropriate processing on the packet. Advantageously, the claimed multi-feature classification memory is configured to store multi-feature packet processing rules, which are formed by merging a plurality of features into a single multi-feature packet processing rule. Thus, by merging features into multi-feature packet processing rules, the "multi-feature CM eliminates the need for individual associated CMs." (Specification, p. 4, ll. 13-14) As also noted in the Specification:

> "Various features implemented in a router can be organized into a feature hierarchy. The feature hierarchy can be based on various user application related factors (i.e., e.g., per entry implementation cost, functionality, subsumability of the feature or the like). According to one embodiment of the present invention, <u>features that require complex packet-processing rules (e.g., full functionality features such as statistics, policing, redirection or the like) and can subsume simple features (e.g., ACL or the like) are considered at the top of the feature hierarchy</u>. Other forms of feature hierarchy are possible." (Specification, p. 4, ll. 18-25; Emphasis supplied)

Thus, the claimed multi-feature packet processing rules provide for a more flexible, efficient manner of packet processing. This distinction is borne out by comparing the claimed invention with the systems disclosed in Uga and Venkatachary. Claim 1 recites:

1. A method of processing a packet in a router comprising:
creating a plurality of multi-feature packet processing rules, wherein
    said creating comprises, for each multi-feature packet processing rule of
        said multi-feature packet processing rules,
            forming said each multi-feature packet processing rule by merging
                a plurality of features according to a feature hierarchy,
    each of said features is defined in said feature hierarchy,
    at least one of said features in said feature hierarchy comprise another of
        said features in said feature hierarchy,
    said at least one of said features in said feature hierarchy is a complex
        feature,
    said another of said features in said feature hierarchy is a simple feature,
        and
    said at least one of said features in said feature hierarchy subsumes said
        another of said features in said feature hierarchy;
populating said plurality of multi-feature packet processing rules in a multi-
        feature classification memory;
populating an associated content-addressable memory with a plurality of indices,
        wherein
    said indices are indices of said plurality of multi-feature packet processing
        rules in said multi-feature classification memory,
    said associated content-addressable memory and said multi-feature
        classification memory are associated with one another by virtue of
        said associated content-addressable memory being coupled to

provide an index of said indices to said multi-feature classification memory, and

each of said indices corresponds to at least one of said multi-feature packet processing rules;

using said index to retrieve a multi-feature packet processing rule from said multi-feature classification memory; and

processing said packet according to said multi-feature packet processing rule.

Applicant respectfully notes that independent claims 9, 17, 24, 32, 40 and 48 recite, among other limitations, limitations substantially similar to those presented above.

By contrast, Uga is directed to:

"A packet classification search device and method ... which are capable of searching rules of packet classification having very long search bit width at high speed while using a CAM which has a limited bit width. The fields of rules of packet classification are grouped into groups, and the grouped fields of each rule are stored along with search related information (except for the initial group) and number of searches information in a CAM. The next number of searches information (if further groups exist which must be searched), comparison related information, and actions related to packets (if further groups exist which must be searched, directing searching again, while if no further groups exist which must be searched, actions for packet classification) are stored

in a search result storage device. By doing this it is made possible to search with the bit width of the group unit." (Uga; Abstract)

By further contrast, Venkatachary is directed to:

"... a Packet Matching System and Method. A Matching Rules Database is quickly searched for a Best Matching Rule for a packet header. Power is conserved in the system by searching only a small subset of rules of the rules database. An All Matching Rules Engine comprising a plurality of Necessary Path Condition Rules is searched to determine which subset of matching rules, or sub-databases, to search for a best matching rule. The sub-databases are then searched by Best Matching Rules sub-Engines and a best matching rule is selected from the results of the sub-database searches by a Collate Engine. The Rules Database is organized according to a Hierarchical Subdivision Tree. Necessary Path Condition Rules and sub-databases are extracted from the Hierarchical Subdivision Tree." (Venkatachary; Abstract)

As an initial matter, Applicant respectfully submits that, among other infirmities, the Office Action correctly notes that Uga fails to show, teach or suggest:

"…
creating a plurality of multi-feature packet processing rules, wherein
    said creating comprises, for each multi-feature packet processing rule of
        said multi-feature packet processing rules,
        forming said each multi-feature packet processing rule by merging
            a plurality of features *according to* **a feature hierarchy**,
    each of said features is defined in said feature hierarchy,
    at least one of said features in said feature hierarchy comprise another of
        said features in said feature hierarchy,
    said at least one of said features in said feature hierarchy is a complex
        feature,
    said another of said features in said feature hierarchy is a simple
        feature, and
    said at least one of said features in said feature hierarchy subsumes
        said another of said features in said feature hierarchy; …"
(Emphasis supplied)

In an attempt to demonstrate the earlier limitations in this portion of claim 1, Office Action turns to Venkatachary. Unfortunately, the approach taken in Venkatachary is counter to that of the claimed invention, and so fails to address the noted shortcoming of Uga. The "rule merging technique" noted in the Office Action is, per the Office Action, discussed at para. 43 of Venkatachary:

"The number of NPCR entries in the All Matching Rules Engine can be reduced, along with the number of sub-rule databases, via a rule merging technique called Rule Subset Hoisting. Through Rule Subset Hoisting, subsets of rules comprising a sub-database having less than a number T_{min} of rules are merged to create a new sub-database having greater than T_{min} rules but less than T rules." (Venkatachary, para. 43)

This passage merely describes a technique for increasing the number of rules in a sub-database, and nothing more.

This provides a segue into a discussion of a major flaw of Venkatachary in its supposed teaching of various limitations of the claimed invention. The sub-databases of Venkatachary are created to reduce the number of rules that must be analyzed to determine the manner in which a packet needs to be processed. (Venkatachary, paras. 6 and 7) By choosing an appropriate sub-engine (which analyzes a sub-database), fewer than all rules are analyzed. But the approach used in Venkatachary still analyzes each rule, if it is to be analyzed, separately. There is no provision, or even recognition, that such rules can be merged with one another.

Moreover, even if Uga or Venkatachary, taken alone or in some permissible combination, somehow showed, taught or suggested the claimed merging and resulting multi-feature packet processing rules (which Applicant maintains is not the case), nowhere in Uga or Venkatachary is there shown, taught or suggested a complex feature that subsumes a simple feature, as in the claimed invention. Applicants are unable to discern any teaching in Uga or Venkatachary that addresses the complexity of any rules

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described therein, nor any such relationships. As before, the references make no provision for, nor even provide any recognition of the complexity that any such rules might have, nor any relationship between such rules' complexities.

Applicant therefore respectfully submits that the Office Action does not establish the presence of these limitations in Uga or Venkatachary, taken alone or in any permissible combination. As will be appreciated, the Office Action bears the burden of supporting a case of obviousness, including whether the prior art references teach or suggest all of the claim limitations. *See* MPEP 706.02(j).

For at least the foregoing reasons, Applicant respectfully submits that claims 1, 9, 17, 24, 32, 40 and 48, and all claims dependent thereon, are in condition for allowance. Applicant therefore requests the Examiner's reconsideration of the rejection of those claims.

CONCLUSION

In view of the amendments and remarks set forth herein, the application and the claims therein are believed to be in condition for allowance without any further examination and a notice to that effect is solicited. Nonetheless, should any issues remain that might be subject to resolution through a telephonic interview, the Examiner is invited to telephone the undersigned.

If any extensions of time under 37 C.F.R. § 1.136(a) are required in order for this submission to be considered timely, Applicant hereby petitions for such extensions. Applicant also hereby authorizes that any fees due for such extensions or any other fee associated with this submission, as specified in 37 C.F.R. § 1.16 or § 1.17, be charged to Deposit Account 502306.

Respectfully submitted,

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